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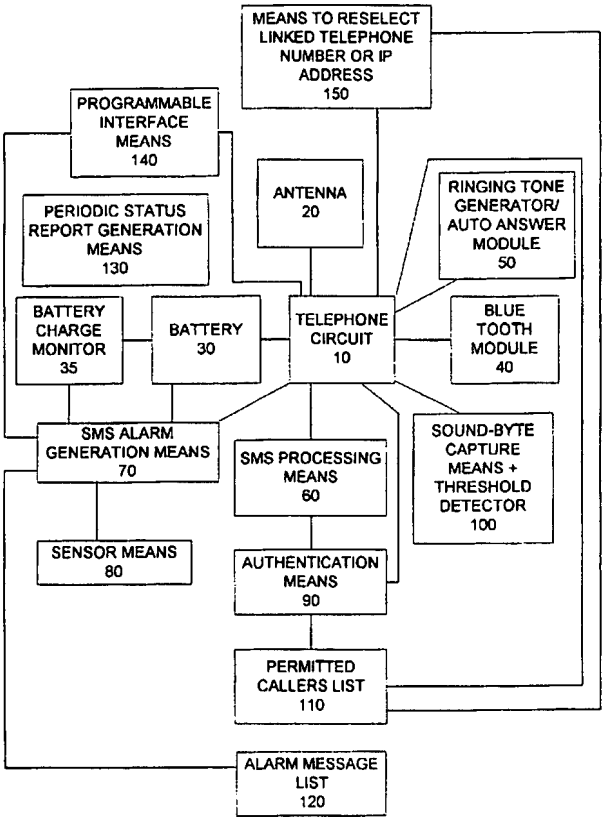
(54) Title: PROGRAMMABLE COMMUNICATOR



(57) Abstract: A system and method for a programmable communicator is described which can provide an improved child communication device, a telecommunications platform for a smart clothes application, as well as a programmable remote data communicator to report the status of a technical apparatus such as a vending machine. The programmable communicator can be programmed remotely by a mobile phone or any Personal Data Assistant (PDA) type device using any data transmission technology such as BlueTooth, Infra red light or any wireless radio communication either directly at close range, or via a mobile telecommunications network connection from a hand-held device or computer terminal connected to a data or IP transmission network such as the Internet.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

answered, this information may be used to enable the programmable communicator to receive the call or to reject it.

Additional codes may be used by authenticated callers to interrogate the status condition of the programmable communicator, or to interrogate the status of data monitoring devices to which the communicator is wired or wirelessly attached.

In this way, in the application for an improved child communicator, only persons knowing the secret PUK code would be able to change the calling number. This provides the essential security for the parents. Furthermore, the feature, which causes the communicator to reject all calls but those from telephone numbers on the permitted callers list serves to shield the child from unwelcome contact.

The following example demonstrates how five SMS messages might program the permitted callers list A-E

SMS 1. PUK code A:040 111 1111
SMS 2. PUK code B:040 222 2222
SMS 3. PUK code C:040 333 3333
SMS 4. PUK code D:040 444 4444
SMS 5. PUK code E:040 555 5555

The letters A to E in the five messages or any equivalent coding may be used to designate the priority of the telephone numbers of the permitted callers such that letter A designates the number to which the programmable communicator is linked at this moment.

In a simple use scenario, a child may be playing in the garden or near to the house wearing a

programmable communicator programmed to the mother's telephone phone number, 040 111 1111. In the next moment, the father comes home and sends an SMS to the child's programmable communicator using his phone having telephone number 040 222 2222. In this example, the message comprises PUK code A:040 222 2222 which cause the calling number of the programmable communicator to be now reprogrammed to call the father's number if its call button is pressed by the child.

An additional security feature comprises software, which will cause an SMS emergency message to be sent automatically to the pre-programmed number if the wrist strap is broken or undone, or the communicator is switched off. An additional sensor may be used instead of a means to generate an SMS message if the wrist strap is broken or undone whereby said sensor can sense the heat of the skin, which will cause an SMS message to be sent if the communicator is moved away from the skin.

Additional software features may generate messages to indicate the charge of the battery or if the battery drains completely or is removed.

To avoid a total failure condition, the programmable communicator may comprise a separate back-up power supply in addition to the battery, which is sufficient to generate an alarm message or number of alarm messages, in the instance that a power connection is lost from an associated device or if its own battery supply drains completely.

In this way, the telephone number to which the programmable communicator is linked receives messages

about the status of the battery and an indication of whether the communicator has been removed from the child.

In a separate embodiment, is included the feature that certain alarm messages are sent to one or more of the telephone numbers, or IP addresses in the IP network application of this invention, which are on the permitted callers list. This feature would enable at least one other person to receive an alarm message in case the primary linked telephone is busy or the associated user of the linked telephone is unable to read the message immediately.

The programmable communicator comprises a processing module, which can receive information about its wrist strap or associated attachment. In the embodiment of a smart clothes tag, the said associated attachment may comprise a fibre or wire, which, if mechanically pulled, causes the generation of an alarm message. Clearly, in the case of a wrist worn communicator, the opening or closing of the wrist strap may be used to activate an electronic circuit to generate a status condition of the wrist strap. It is anticipated that the receiver of the alarm message may then call the child directly, if possible, to check if there is a problem. Additionally, location based services may be used to locate the position of the communicator relative to the network infrastructure.

In a separate embodiment, the programmable communicator comprises a feature, which enables a user to cause it to transmit a status message periodically, according to a periodic duration as set by the user, which will provide reassurance that the communicator is functioning correctly, and for example, that the wrist strap is closed, and that the battery has sufficient power.

The types of data that the communicator can provide periodically, or on request, are determined directly by the application of the invention according to different remote monitoring embodiments. In each application the programmable communicator has the appropriate means to receive the data from the monitoring device and the means to process the data.

The programmable communicator has further direct application to the field of remote data monitoring

such as in the home network environment. Today, domestic appliances such as washing machines and sauna heaters remain separate from one another and only a few have the capability to be integrated into remote monitoring applications.

The programmable communicator may be used to generate data messages, which describe the status or change in status beyond a threshold condition, of a household appliance and communicate this data directly to a linked telephone number or IP address of a linked device or Internet web page.

The use of GSM GPRS packet switching technology in this context is ideal since the application does not require a continuous circuit switched connection to the network. The remote monitoring application comprises the use of a programmable communicator, which reacts to a status condition and then initiates a packet data transmission to the network. Consequently, the programmable communicator comprises a separate back-up power supply in addition to the battery, which is sufficient to generate an alarm message or number of alarm messages, in the instance that a power connection is lost from an associated device or if its own battery supply drains completely.

In a separate home-network application, the programmable communicator may be used to gather data from a number of associated monitoring devices and to communicate this to the linked telephone or IP device or Internet web page. The monitoring devices may be directly linked to the programmable communicator by

wire or wirelessly connected by, for example, the BlueTooth radio technology in which case the programmable communicator comprises the necessary additional BlueTooth communications module.

In a sports or safety application, the programmable communicator may comprise a smart clothes tag and be sewn into the lining of a life vest such that a person paddling a canoe may use it for urgent communication.

Other applications for the programmable communicator include theme parks and other sports events or places where children may become lost in the crowds.

In addition, the invention may be utilised as a voice and data communicator for bicycles. In this application, data from the bicycle such as speed could be used in sports training as a means to enhance the performance of a cyclist. In a more general application, a programmable communicator can be used to inform the owner of a bicycle that his parked bicycle is being moved and to determine its location, if needed, by making use of the location-based services functionality of the telecommunications network.

While only one embodiment of the present invention: the programmable communicator within the context of the digital GSM telephone system in particular, has been shown and described in detail, it will be obvious to those persons of ordinary skill in the art, that many changes and modifications may be made thereunto without departing from the spirit of the invention. For example, the hot link communicator may

make use of any telephone technology such as CDMA, and US-TDMA. Moreover, the inventive features of the programmable communicator may be incorporated into a monitoring device and integrated with it such that the device comprises the capability of the programmable communicator. The invention is not limited to the application of the programmable communicator as a separate device, which separately communicates with data monitoring devices but also includes the application of the functionality of the invention as an integrated part of the monitoring device.

It is further to be understood that the invention may make use of all coding schemes for storing numbers to the programmable apparatus and the use of the PUK code was by way of example only. The programmable communicator may comprise the means to accept all manner of clip on covers so that the same base model may carry one of a number of different covers to suit the tastes and the age groups of different wearers.

CLAIMS:

1. A method for programming a programmable communicator device comprising a digital mobile telephone circuit, a rechargeable battery, a compact antenna, a remotely pre-programmable identity module, said programmable communicator device being remotely pre-programmed by a programming transmitter being a first mobile or fixed device with at least one second mobile or fixed device to which said programmable communicator device is to be linked, said method being characterised by the steps of:

said programmable communicator device receiving a first message comprising a coded number in order to determine the authenticity of said programming transmitter,

comparing said coded number with a preset number:

when said coded number and preset number coincide, allowing said programming transmitter to proceed,

when said coded number and preset number do not coincide, cutting the communication.

2. A method for programming a programmable communicator device according to claim 1 wherein said coded number is a unique ID number associated with the remotely pre-programmable identity module such as the PUK number, in the case of GSM, of said programmable communicator device.

3. A method for programming a programmable communicator device according to claim 1 or 2 further comprising a memory, where said step of said

programming transmitter to proceed further comprising the steps of:

sending one or a plurality of telephone numbers to be called by said programmable communicator device, and to store said plurality of telephone numbers in said memory, and

sending one or plurality of telephone numbers said programmable communicator device is to call, and to store said plurality of telephone numbers in said memory.

4. A method for programming a programmable communicator device according to claim 3 wherein said one or plurality of telephone numbers said programmable communicator device is to call are prioritised.

5. A method for programming a programmable communicator device according to claims 1-4 wherein said programming transmitter and said programmable communicator device communicate via an IP network (such as the Internet) and that one or a plurality of IP addresses are received and stored in said memory.

6. A method for programming a programmable communicator device according to claim 5 wherein said programmable communicator device sends data messages such as e-mails and receives digital data.

7. A method for programming a programmable communicator device in use for monitoring emergency calls according to claims 5 or 6 further comprising the steps of:

prompting said programmable communicator device by a specific sensing means when said specific sensing means state passes a threshold,

repeatedly calling one or more of said stored telephone numbers until an alarm is successfully sent.

8. A method for programming a programmable communicator device according to claims 7 in use for monitoring emergency calls further comprising the steps of:

prompting said programmable communicator device with a specific sensing means when said specific sensing means state passes a threshold condition with a digital signal,

storing said digital signal corresponding to said specific sensing means

sending said digital signal in the form of a data message such as an e-mail to one or a plurality of stored IP addresses each associated with a remote digital device or an internet web page, and

repeatedly calling one or more of said stored telephone numbers until an alarm is successfully sent.

9. A method for programming a programmable communicator device according to claims 5 or 6 in use for monitoring the status of one or a plurality of remote devices further comprising the steps of:

said programming transmitter sending one or a plurality of codes to said programmable communicator device

prompting said programmable communicator device to initiate one or a plurality of remote devices to be monitored.

10. A method for programming a programmable communicator device in use for monitoring the status of one or a plurality of remote devices according to claims 9 wherein said remote device is a medical device.

11. A method for programming a programmable communicator device in use for monitoring the status of one or a plurality of remote devices according to claims 9 or 10 further comprising the steps of:

said programming transmitter sending one or a plurality of digital commands to said programmable communicator device,

prompting said remote device to read said one or a plurality of digital commands to initiate itself to execute a task and to periodically write measured physical data or process status in a digital form and/or its position and/or date and time of one or a plurality of bytes into said programmable communicator device memory.

12. A method for programming a programmable communicator device in use for monitoring the status of one or a plurality of remote devices according to claims 11 further comprising the step of:

either periodically calling said programmable communicator device by a surveillance mobile or fixed device, sending one of said codes as required to authenticate itself in order to prompt said programmable communicator device to send its stored digital data and to flush its memory,
or said programmable communicator device periodically calling one or a plurality of stored telephone numbers in order to send its stored digital data and to flush its memory,
or said programmable communicator device periodically sending a data message such as an e-mail to one or more of said stored IP addresses each associated with one or more remote digital devices or an internet web page in order to send its stored digital data and to flush its memory.

13. A method for programming a programmable communicator device in use for monitoring the status of one or a plurality of remote devices according to claims 12 further comprising the step of:

analysing said sent digital data to survey the evolution of a health state of a surveyed person or of an evolving process in order to take further action according to the degree of emergency of said surveyed person or process, and

if necessary, said further action also comprising the step of reprogramming said programmable communicator device in order to re-initiate said

remote device according to said analysis to execute said task with other digital data comprising other parameters sent to said programmable communicator device.

14. A programmable communicator device comprising a digital mobile telephone circuit, a rechargeable battery, a compact antenna, a remotely pre-programmable identity module, said programmable communicator device being remotely pre-programmed by a programming transmitter being a first mobile or fixed device with at least one second mobile or fixed device to which said programmable communicator device is to be linked, said programmable communicator device being characterised by:

processing means for decoding a coded transmission in the form of a first message comprising a coded number, which determines the authenticity of said programming transmitter allowing it to program said programmable communicator device.

15. A programmable communicator device according to claim 14 further characterised in that:

said authenticated transmitter transmits a second message comprising one or a plurality of codes of one or a plurality of mobile or fixed authorised devices by which said programmable communicator device is to be called to pre-program said identity module.

16. A programmable communicator device according to claim 14 or 15 further characterised in that it further comprises:

a ringing tone generator, a basic two-way microphone device, and a digital processing device for monitoring emergency calls.

17. A programmable communicator device for monitoring emergency calls according to claim 16 wherein said authenticated programming transmitter transmits codes of one or a plurality of mobile or fixed authorised devices by which said programmable communicator device is to be called to pre-program said identity module.

18. A programmable communicator device for monitoring emergency calls according to claim 17 wherein said authenticated programming transmitter transmits the telephone numbers of one or a plurality of mobile or fixed devices to which said programmable communicator device is to call to pre-program said identity module.

19. A programmable communicator device for monitoring emergency calls according to claim 17 or 18

wherein said programming transmitter is a portable device or a computer terminal connected to a data or to an IP transmission network (such as the Internet).

20. A programmable communicator device for monitoring emergency calls according to claim 17 or 18 wherein said programmable communicator device further comprises a pressure sensitive means in order to prompt said programmable communicator device when a specific condition is met.

21. A programmable communicator device for monitoring emergency calls according to claim 17 or 18 wherein said programmable communicator device further comprises a proximity detector in order to prompt said programmable communicator device when a specific condition is met.

22. A programmable communicator device for monitoring emergency calls according to claim 17 or 18 wherein said programmable communicator device further comprises a heat sensor in order to prompt said programmable communicator device when a specific condition is met.

23. A programmable communicator device for monitoring emergency calls according to claim 17 or 18 wherein said programmable communicator device further comprises an infrared heat detector in order to prompt said programmable communicator device when a specific condition is met.

24. A programmable communicator device comprising a heat sensor according to claim 22 or 23 wherein said programmable communicator comprises an intelligent fire alarm which can communicate that a fire is in progress to an emergency fire centre and/or to devices associated with other emergency personnel.

25. A programmable communicator device for monitoring emergency calls according to claim 17 or 18 wherein said programmable communicator device further comprises a sound detector in order to prompt said programmable communicator device when a specific condition is met.

26. A programmable communicator device for monitoring emergency calls according to claim 17 or 18 wherein said programmable communicator device further comprises a back-up communication device within a wrist strap or a smart clothes attachment comprising a tag in order to prompt said programmable communicator device when said strap or attachment is broken or undone.

27. A programmable communicator device for monitoring emergency calls according to claims 17-25 wherein said specific condition is a threshold and when prompted said programmable communicator device will call one or more of said pre-programmed numbers or transmit data to one or more IP addresses each associated with one or more remote digital devices in order to trigger an alarm and/or send a digital message.

28. A programmable communicator device for monitoring emergency calls according to claim 26 or 27 wherein said programmable communicator device further comprises means for continually emitting a call as a beacon in order to allow said programmable communicator device to be located.

29. A programmable communicator device for monitoring emergency calls according to claim 26 or 27 wherein said programmable communicator device further comprises means to send a message comprising a byte or a series of bytes in the form of a data message such as an E-mail to said one or to said plurality of pre-programmed numbers or IP addresses each associated with one or more remote digital devices or internet web page.

30. A programmable communicator device for monitoring emergency calls according to claim 26 or 27 wherein said programmable communicator device allows a person under medical surveillance, to call said one or more of said pre-programmed numbers in order to trigger an alarm when said person under medical surveillance requires help.

31. A programmable communicator device for monitoring emergency calls according to claim 26 or 27 wherein said programmable communicator device further comprises a continuous retry feature such that the attempts to call said one or more of said pre-programmed numbers to trigger said alarm or to send said digital signal is

continued until said alarm or said digital signal is successfully sent.

32. A programmable communicator device for monitoring emergency calls according to any of claims 14-31 wherein said programmable communicator device is further characterised that it comprises a unique button protruding to call and receive calls, and no keypad or display.

33. A programmable communicator device for monitoring emergency calls according to claims 14-32 wherein said programmable communicator device is further characterised in that it comprises an auto answer facility.

34. A programmable communicator device for monitoring emergency calls according to claim 32 or 33 for use in a life vest of canoe or boat sportsmen in order to alert a central control point to go to their rescue.

35. A programmable communicator device for monitoring emergency calls according to claim 32 or 33 for use in the clothing of skiers in order to alert a central control point to go to their rescue when in danger on or below the snow.

36. A programmable communicator device according to claim 14 further characterised in that it further comprises an auto answer module and a digital processing device for monitoring the status of one or a plurality of remote technical devices.

37. A programmable communicator device for monitoring the status of one or a plurality of

remote technical devices according to claim 36 wherein said authenticated transmitter transmits one or a plurality of telephone numbers of one or a plurality of mobile or fixed devices which said programmable communicator device is to call to pre-program said identity module.

38. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 36 or 37 wherein said programming transmitter is a portable device or a computer terminal connected to a data or to an IP transmission network (such as the Internet) and said programmable communicator device stores IP addresses instead of numbers into its memory.

39. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 36 to 38 wherein said programmable communicator device further comprises a pressure measuring means in order to monitor a process and to convert one or a plurality of measured pressures into a digital signal representing the status and to store said status and the date and/or time of said one or said plurality of measured remote technical devices.

40. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 36 or 37 wherein said programmable communicator device further comprises a locating system in order to monitor the location of said remote technical device and means to store one or a plurality of measured locations in the form of a digital signal representing a location or a series of locations and to store said measured locations and the date and/or time of said one or said plurality of measured locations of said remote technical devices.

41. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claims 40 for use in a theme park environment for monitoring the location of children and/or of people under medical surveillance.

42. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 40 wherein

said locating system comprises a satellite Global Positioning System (GPS) circuit.

43. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 40 or 41 wherein said programmable communicator device further comprises a heat sensor means in order to monitor the temperature of said remote technical device and means to store one or a plurality of measured temperatures in the form of a digital signal representing a temperature or a series of temperatures and to store said measured temperatures and the date and/or time of said one or said plurality of measured temperature of said remote technical device.

44. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 43 wherein said heat sensor system comprises an infrared heat detector.

45. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 37 or 38 wherein said programmable communicator device further comprises means to detect the state of a vending machine and means to store said state in the form of a digital message representing said state using one or more bytes.

46. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 45 wherein said states are user programmable.

47. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 46 wherein said states are EMPTY and NEARLY-EMPTY for one or a plurality of products.

48. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 37 or 38 wherein said programmable communicator device further comprises a voice recognition means and means to store a sound message as one or a plurality of sound bytes.

49. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 37 or 38 wherein said programmable communicator device further comprises a medical device to monitor the health of a physically disabled person, and means to store one or a plurality of status data.

50. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 49 wherein said medical device is a periodic or continuous electrocardiogram heart rhythm monitoring device.

51. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 49 wherein said medical device is a blood glucose concentration-monitoring device.

52. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 49 wherein said medical device is a blood electrolyte concentration-monitoring device.

53. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 49 wherein said medical device is a kidney function and/or liver function monitoring device.

54. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 49 wherein said medical device is a blood clotting factor monitoring device.

55. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 49 wherein said medical device is a labour contraction-monitoring device.

56. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 39-55 wherein said monitoring device is remotely polled by authorised callers with one or a plurality of different commands in order to send a different set of stored data each of said different set of stored data corresponding to said one or said plurality of different commands.

57. A programmable communicator device for monitoring the status of one or a plurality of

remote technical devices according to claim 39-55 wherein said monitoring device periodically send messages comprising said stored data to pre-programmed numbers at said fixed or mobile device in order to allow them to gather the evolving states of said technical remote devices for analysis and further actions to be taken.

58. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 57 wherein said actions to be taken includes reprogramming said programmable communicator device.

59. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 56 or 57 wherein said fixed or mobile device communicates via an IP network such as the Internet and said programmable communicator device sends said stored data in the form of a data message such as an e-mail to one or more IP addresses each associated with a remote digital device or internet web page.

60. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claims 36 or 37 wherein said transmitting device is an infrared light.

61. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 57

for use in the home network environment for monitoring domestic appliances.

62. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to claim 36 wherein said coded number is the unique ID number associated with the remotely pre-programmable identity module such as the PUK number in the case of GSM.

63. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to any of claims 14 and claims 36 to 62 wherein said programming transmitter uses a Blue tooth radio module and said programmable communicator device comprises also a Blue tooth radio module.

64. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to any of claims 14 and claims 36 to 62 wherein said programming transmitter communicates with said programmable communicator device using the short message service (SMS) circuit-switched service of the GSM telecommunications standard.

65. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to any of claims 14 and claims 36 to 62 wherein said programming transmitter communicates with said programmable communicator device via the CDMA or the WCDMA telecommunications standard.

66. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to any of claims 14 and claims 36 to 62 wherein said programming transmitter communicates with said programmable communicator device via the US-TDMA telecommunications standard.

67. A programmable communicator device for monitoring the status of one or a plurality of remote technical devices according to any of claims 14 and claims 36 to 62 wherein said programming transmitter communicates with said programmable communicator device using the GSM GPRS packet switching telecommunications standard.

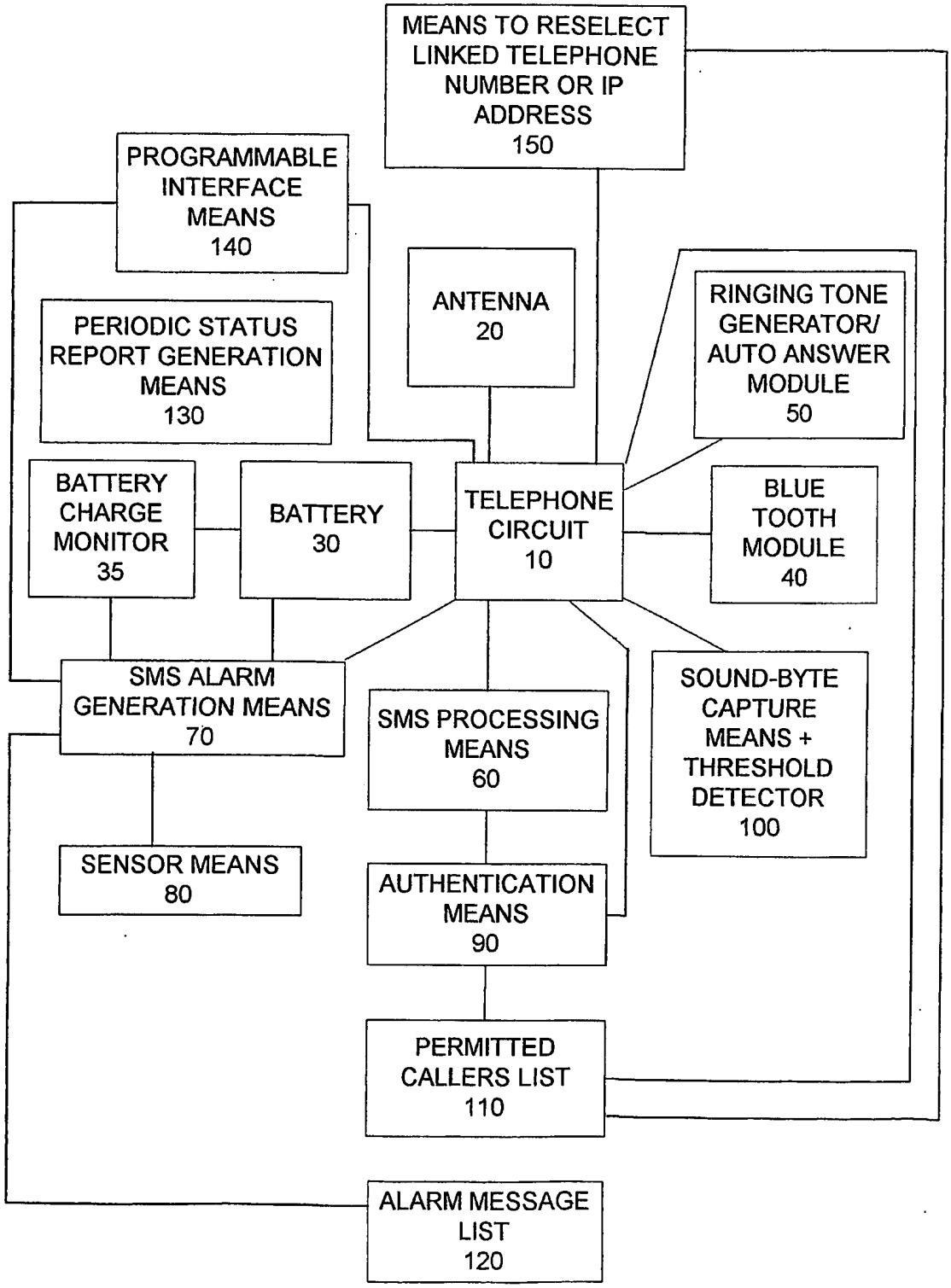
MEANS TO RESELECT LINKED TELEPHONE NUMBER OR IP ADDRESS 150
PROGRAMMABLE INTERFACE MEANS 140
ANTENNA 20
RINGING TONE GENERATOR/ AUTO ANSWER MODULE 50
PERIODIC STATUS REPORT GENERATION MEANS 130
BATTERY CHARGE MONITOR 35
BATTERY 30
TELEPHONE CIRCUIT 10
BLUE TOOTH MODULE 40
SMS ALARM GENERATION MEANS 70
SMS PROCESSING MEANS 60
SOUND-BYTE CAPTURE MEANS + THRESHOLD DETECTOR 100
SENSOR MEANS 80
AUTHENTICATION MEANS 90
PERMITTED CALLERS LIST 110
ALARM MESSAGE LIST 120

FIGURE-1

2/3

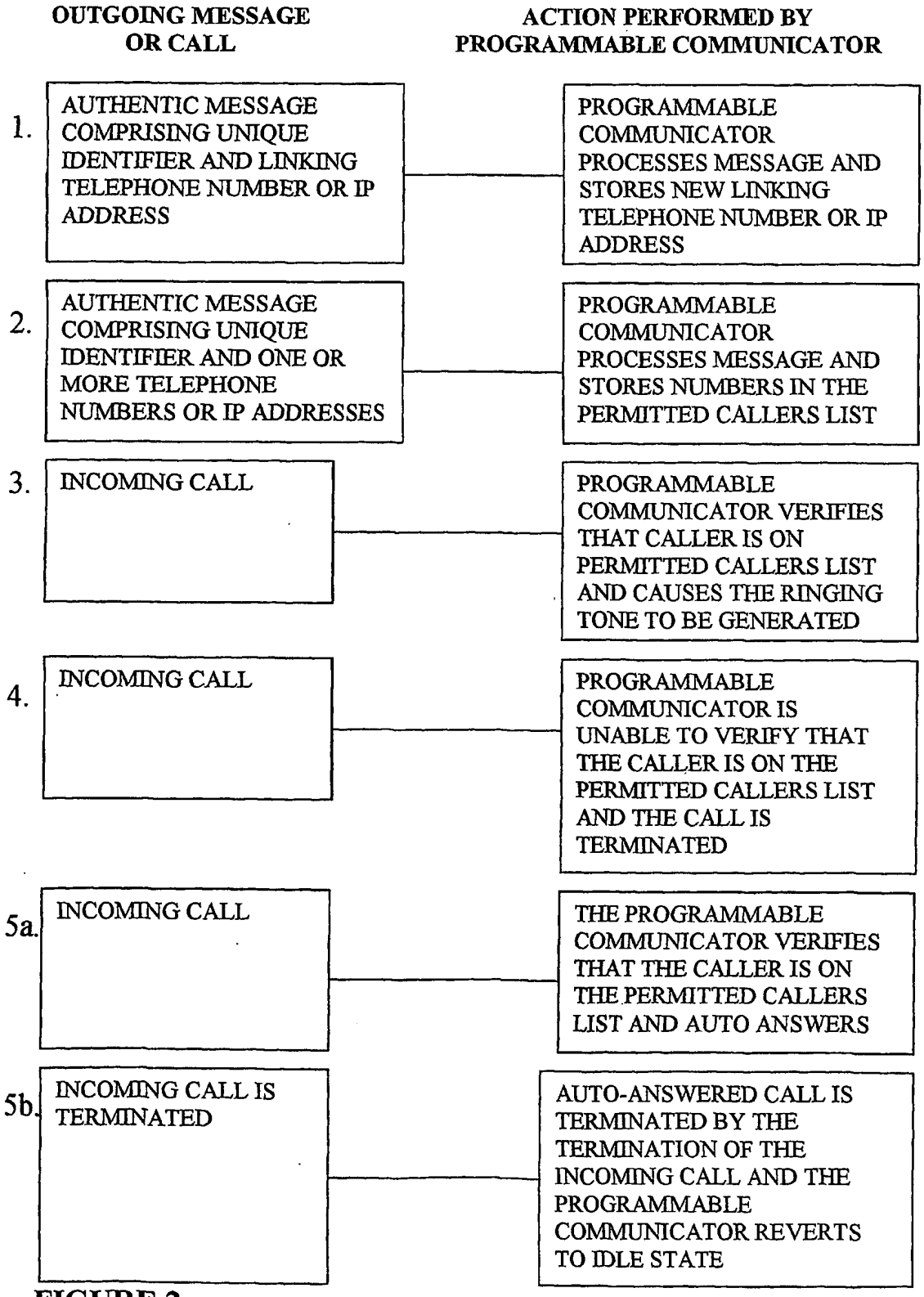
OUTGOING MESSAGE OR CALL
ACTION PERFORMED BY PROGRAMMABLE COMMUNICATOR
1.
AUTHENTIC MESSAGE COMPRISING UNIQUE IDENTIFIER AND LINKING TELEPHONE NUMBER OR IP ADDRESS
PROGRAMMABLE COMMUNICATOR PROCESSES MESSAGE AND STORES NEW LINKING TELEPHONE NUMBER OR IP ADDRESS
2.
AUTHENTIC MESSAGE COMPRISING UNIQUE IDENTIFIER AND ONE OR MORE TELEPHONE NUMBERS OR IP ADDRESSES
PROGRAMMABLE COMMUNICATOR PROCESSES MESSAGE AND STORES NUMBERS IN THE PERMITTED CALLERS LIST
3.
INCOMING CALL
PROGRAMMABLE COMMUNICATOR VERIFIES THAT CALLER IS ON PERMITTED CALLERS LIST AND CAUSES THE RINGING TONE TO BE GENERATED
4.
INCOMING CALL
PROGRAMMABLE COMMUNICATOR IS UNABLE TO VERIFY THAT THE CALLER IS ON THE PERMITTED CALLERS LIST AND THE CALL IS TERMINATED
5a.
INCOMING CALL
THE PROGRAMMABLE COMMUNICATOR VERIFIES THAT THE CALLER IS ON THE PERMITTED CALLERS LIST AND AUTO ANSWERS
5b.
INCOMING CALL IS TERMINATED
AUTO-ANSWERED CALL IS TERMINATED BY THE TERMINATION OF THE INCOMING CALL AND THE PROGRAMMABLE COMMUNICATOR REVERTS TO IDLE STATE

FIGURE 2.

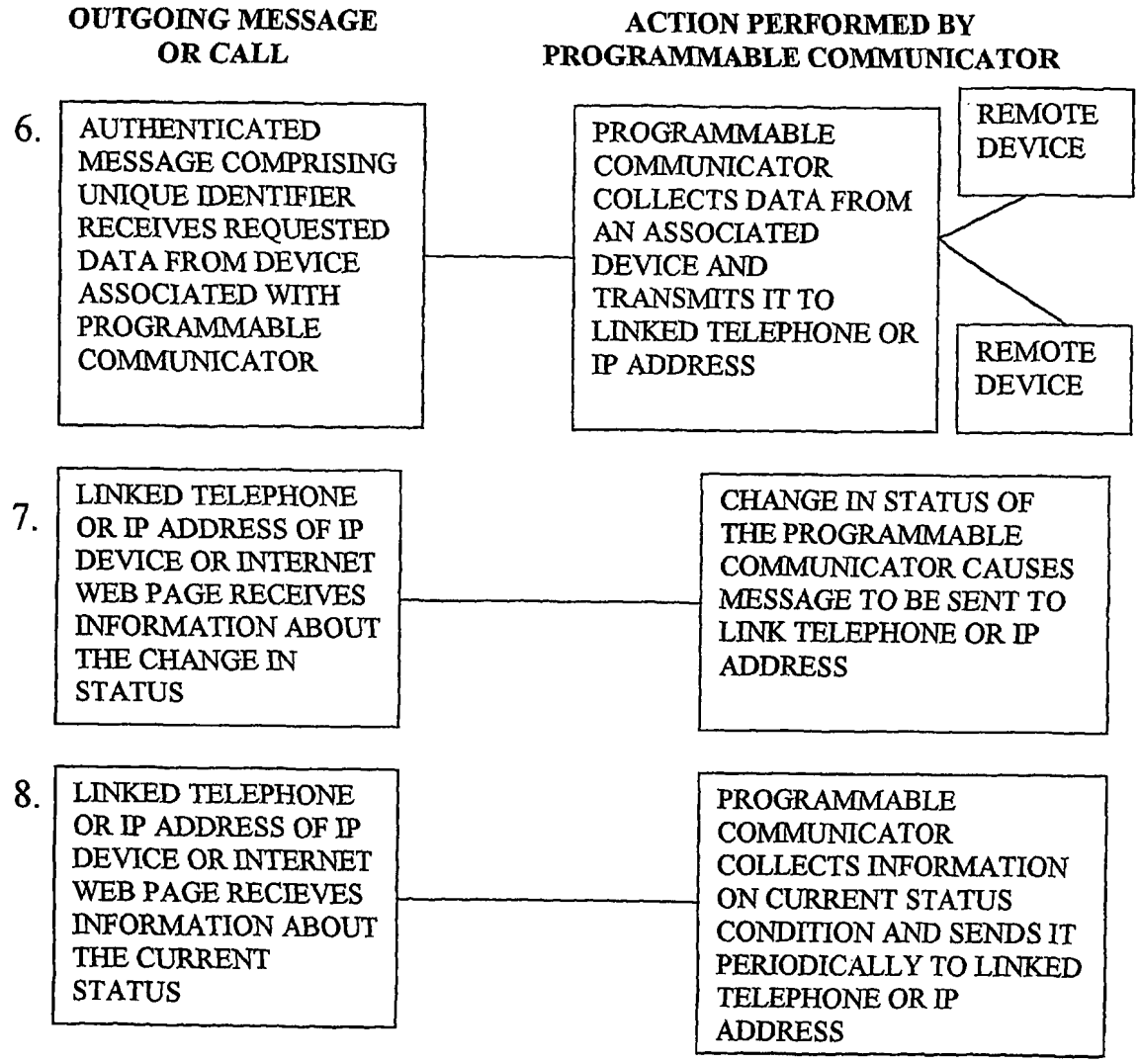
OUTGOING MESSAGE OR CALL
ACTION PERFORMED BY PROGRAMMABLE COMMUNICATOR
6.
AUTHENTICATED MESSAGE COMPRISING UNIQUE IDENTIFIER RECEIVES REQUESTED DATA FROM DEVICE ASSOCIATED WITH PROGRAMMABLE COMMUNICATOR
PROGRAMMABLE COMMUNICATOR COLLECTS DATA FROM AN ASSOCIATED DEVICE AND TRANSMITS IT TO LINKED TELEPHONE OR IP ADDRESS
REMOTE DEVICE
REMOTE DEVICE
7.
LINKED TELEPHONE OR IP ADDRESS OF IP DEVICE OR INTERNET WEB PAGE RECEIVES INFORMATION ABOUT THE CHANGE IN STATUS
CHANGE IN STATUS OF THE PROGRAMMABLE COMMUNICATOR CAUSES MESSAGE TO BE SENT TO LINK TELEPHONE OR IP ADDRESS
8.
LINKED TELEPHONE OR IP ADDRESS OF IP DEVICE OR INTERNET WEB PAGE RECIEVES INFORMATION ABOUT THE CURRENT STATUS
PROGRAMMABLE COMMUNICATOR COLLECTS INFORMATION ON CURRENT STATUS CONDITION AND SENDS IT PERIODICALLY TO LINKED TELEPHONE OR IP ADDRESS

FIGURE 3

PROGRAMMABLE COMMUNICATOR

DESCRIPTION

BACKGROUND OF THE INVENTION

The invention relates to a programmable wireless communications apparatus. More particularly, it relates to a programmable wireless communications apparatus, which can provide an improved means of communication between children and their parents, between elderly persons and caring relatives, and between mentally less-able individuals and supervising adults. In addition, the invention provides a solution for smart clothes applications, which may comprise a telecommunications means within the lining of a jacket or other article of clothing, as well as a solution for user-programmable data tags which convey information from remotely located devices such as vending machines. The invention relates to and significantly improves upon a previously filed patent application claiming Finnish priority of 9th September 1997 entitled a Portable Hotlink Communicator published as international patent application PCT/GB98/02715.

In this previously filed application, is taught the invention of using a mobile phone comprising a programmable identity module such as a SIM card, in the context of the GSM telecommunications standard, to program the number of any mobile or fixed telephone to which the Hotlink communicator, comprising a similar type of programmable identity

module, is to be linked. Existing and known methods of communication between the mobile phone and Hotlink communicator for the purpose of programming comprise the obvious choice of data calls such as the Short Message Service in the GSM telecommunications standard. Alternatively a PDA type communicator might call up a web page to instruct a network element to program the programmable identity module of the Hotlink with the number of any fixed or mobile telephone to which the Hotlink communicator is to be linked.

This use of a separate mobile phone to program the number to which the Hotlink may call is particularly useful and convenient should a parent wish to change the number if the parent must leave shortly and want that the Hotlink is connected immediately to the mobile phone or fixed line of another parent or supervising neighbour.

The current invention builds upon the teaching of this earlier application and extends the concept significantly that it has more general and suitable application to both the child Hotlink communicator and also to the field of programmable wireless data communication tags for the purpose of providing information about the status of a vending machine or other piece of technical equipment such as a home appliance or a device to monitor whether a door is open or closed.

In addition to this, the current invention relates directly to programmable wireless data communication tags, which comprise the means to be interfaced directly with other technical equipment such that each tag can be programmed remotely by any means to be linked to any fixed or mobile telephone to enable data to be sent to or from the device and to allow a person to make a voice call connection to the linked telephone.

Today parents are concerned whether to provide a young child with a mobile phone or not. The concern relates to the cost of the mobile phone should it be lost or stolen and also to the cost of the use of the mobile phone. Clearly there is a need to provide a means to limit the cost of calling and also to provide a means to prevent the child dialling overseas numbers for extensive periods of time.

In the context of mobile phone operators, there exists a need to provide a simple and effective communication device, which can provide the means for family tariffing such that subscriptions for children can be related to the subscriptions of their parents' mobile phones. An improved child Hotlink

communicator, which restricts the usage of the mobile phone and thereby does not generate high charges through uncontrolled calling, is clearly a solution to the family tariffing challenge.

Parents are often concerned about the whereabouts of their children and new positioning technologies are being developed for locating mobile phones. These solutions include self-positioning solutions and remote positioning solutions. One example of a self-positioning solution includes the satellite-based Global Positioning System technology in which the mobile phone comprising a GPS signal processing circuit is able to determine the coordinates of its own position by processing signals received from satellites and communicate these coordinates to a location centre associated with the network. One example of a remote positioning solution is the method taught in US patent 5,051,741 claiming priority of 27th March 1990 in which the mobile phone is paged and caused to transmit a response which is processed by communication stations such as time-of-arrival measurement units associated with the network of master stations or base stations.
This remote positioning method has the advantage that the position of the mobile phone can be determined by making use of existing signalling between the mobile phone and the network without requiring any changes to the mobile phone, which would increase its cost. The generic network-based, remote-positioning architecture method of US 5,051,741 may make use of time of arrival methods or phase difference calculations to increase the resolution of the area or sector within which the mobile phone is located.

While the location of the mobile phone itself is a good indication of the present location of the person carrying the mobile phone, an improvement would be a means to lock the mobile phone to the child, such that use of the mobile phone positioning technologies would then determine the position of the child.

In addition to these concerns about the failures of existing mobile communications technology to provide an improved and more secure method of instant communication between a parent and a young child, and the means to determine the position of the child, there is additional concern that the battery of the communicator may drain its power without the parent knowing, or may be removed, which would prevent the communicator from receiving calls or dialling to the programmed fixed or mobile number to which the communicator is linked.

In addition to these specific communication problem needs, there is a growing yet unsubstantiated concern about the potentially harmful effect of electromagnetic radiation from mobile phones upon the developing brains of young children. Within this context, there is an opportunity to design a communication device for children, which positions the radiating electromagnetic field of a communication device away from the close proximity of the brain. In this regard, parents who maintain the belief that mobile telephones present a health risk due to the radiating antenna may rest secure in the knowledge that this risk can be significantly reduced.

In a separate context, there exists a growing need for a mobile telephone solution, which is cost effective to manufacture, but which is versatile such that it can form the basis for a smart clothes tag or communications application platform. In this context the requirement is for an embedded mobile phone platform comprising no keypad or display, which may be sewn into the lining of a jacket, or other article of clothing, having only the call button protruding and a simple pin connection to recharge the battery. The problem with prior art solutions is that unless the smart clothes tag can be user-programmable to call any fixed or mobile number by making use of an acceptable method such as via an SMS data call or via a BlueTooth radio transmission from a mobile phone or intelligent PDA, the solution is impractical to implement.

In security applications where emergency service personnel carry hand-held primary communications devices such as conventional mobile phones, a back-up communications device such as a smart clothes embedded tag can be of great value in the instance that the primary communications device is lost or broken.

In sports areas such as on lakes where there may be people using canoes, a smart clothes communications tag embedded in a life vest may serve to alert a central control point that a person is in difficulty and also to alert other persons in the area to go to their rescue.

In an additional application area, skiers in difficulty would benefit from a smart clothes user-programmable communications tag attached to their clothing, which is pre-programmed to be linked with a fixed or mobile telephone and need only have its protruding button pressed to make communication with a central alarm point.

In an additional application area there exists the need for a user-programmable remote wireless communications data tag, which can be used to relay information about the status of a remote piece of technical equipment such as a vending machine. Home networks could be simplified by making use of the existing mobile network infrastructure to relay data about the status of a home appliance or to indicate whether a door is open or closed. Packet switched technologies such as GPRS may be used as the radio access technology to communicate the status of the technical equipment.

In an additional application area there exists the need for a versatile communications platform, which can be combined with remote health monitoring technology to assist doctors with remote diagnosis of patients.

In an additional application there is the need for a versatile communications which is able to work effectively when the network is temporarily overloaded such that it has the means to store a sound message as a sound byte or convert it using voice recognition software such that it can be forwarded as soon as the network capacity becomes less loaded.

Further to these limitations of existing technologies, and so far as is known, no portable communication apparatus is presently available which serves to offer an improved programmable communicator which is directed towards the specific needs of this problem area as outlined.

OBJECTS OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved programmable communications apparatus, which can be remotely programmed by any mobile phone or IP device such that it can be linked to any particular fixed or mobile phone or IP device.

It is a further object of the present invention to provide a programmable communications apparatus, which may be programmed at close range using infrared light or a BlueTooth radio connection, or via a terminal-to-terminal network based data call such as the GSM SMS short message service or via a GPRS packet data communication.

It is a further object of the present invention to provide a programmable communications apparatus, which may be programmed by a mobile or fixed device which is able to call up an Internet web page and which comprises the means to instruct the network to reprogram the communications apparatus with the mobile or fixed number to which the programmable communications device is to be linked.

It is a further object of the present invention to provide a programmable communications apparatus, which may be programmed via the Internet such that the network communicates with a device in the vicinity of the programmable communications apparatus which itself causes the said apparatus to be programmed using any means such as wireless communication, infrared light or a BlueTooth radio link.

It is a further object of the present invention to provide a plurality of programmable communications apparatuses, which may be simultaneously programmed by a mobile or fixed device which is able to call up an Internet web page and select one or more apparatuses of the said plurality and cause each of the selected number of apparatuses to be linked to the identical mobile or fixed telephone.

It is a further object of the present invention to provide a programmable communications apparatus, which comprises a processing means to process coded transmissions and permit only transmissions comprising a coded number, which determines the authenticity of the message, to be allowed to program the number to which the said apparatus be linked.

It is a further object of the present invention to provide a programmable communications apparatus, which comprises a wrist strap, or an attachment such as in the case of the smart clothes application, and a first alarm means which can be programmed such that it can cause a message to be sent to the fixed or mobile number to which the said apparatus is linked in the case that the wrist strap be broken or undone or in the case that the said attachment be broken or displaced from an initial position of equilibrium.

It is a further object of the present invention to provide a programmable communications apparatus, which may have a separate pressure sensitive means or displaceable means which becomes activated in the pressed position or displaced position respectively such that it is able to generate an alarm or data message when pressure is removed or when the displacement returns to the non-displaced position. Such a feature serves, by way of example, to replace the need for the wrist strap feature of the previous object such that when the wrist worn communicator is removed from the wrist the pressure sensitive means or displaceable means can provide the required alarm message.

It is a further object of the present invention to provide a programmable communications apparatus, which comprises a heat sensor, which can detect that the communicator is adjacent to a heat source such as the skin of a child and the means to generate an alarm message if the heat source is removed.

It is a further object of the present invention to provide a programmable communications apparatus, which has the means to detect any other detectable physical characteristic of the human skin, which may be used to trigger an alarm if the means is moved away from the skin.

It is a further object of the present invention to provide a programmable communications apparatus for a security application, which comprises an infrared heat detector and which is able to generate an alarm message if a change in the level of infrared radiation is detected.

It is a further object of the present invention to provide a programmable communications apparatus, which may form part of a home network of devices, which is used to monitor a domestic appliance such as a washing machine or a device to monitor whether a door or window is open or closed and to react to a change in status of said appliance or device by sending an alarm message or data message to a linked fixed or mobile telephone or internet IP address to indicate a current status of said appliance or device. In addition the said apparatus may be incorporated in a bicycle frame or attached to a bicycle for monitoring movement of the bicycle.

It is a further object of the present invention to provide a programmable communications apparatus, which has a memory means to store sound as a sound byte for a certain period of time such as the voice of the child wearing the programmable communicator and the means to send this sound to the telephone number to which the said apparatus is linked.

It is a further object of the present invention to provide a programmable communications apparatus, which has a means to store and transmit a sound byte in response to receiving a sound above a predetermined threshold such that a person who is in distress may shout out and the distress call is processed by the programmable communicator and forwarded to the fixed or mobile telephone or IP address to which the said communicator is linked.

It is a further object of the present invention to provide a programmable communications apparatus, which is able to make a call to a linked fixed or mobile telephone or IP address and which if it detects that the telephone number is engaged or does not answer or that the IP address is invalid, the said apparatus has the means to select any other telephone number or IP address in the permitted callers list such that it can be connected to said other telephone or IP device.

It is a further object of the present invention to provide a programmable communications apparatus, which is able to store a sound byte or store a data record and send the sound byte or data record to any other telephone number or IP address in the permitted callers list after a certain interval of time in the instance that the primary number or IP address is engaged or connection is not able to be made at that time due to the network capacity not being sufficient at that time. The feature may also include a continuous retry feature such that the attempt to send the sound byte or data record is continued until the sound byte or data record is successfully sent.

It is a further object of the present invention to provide a programmable communications apparatus, which has the means to convert a voice message into text and send this as a data message to a fixed or mobile telephone or IP address to which the said apparatus is linked.

It is a further object of the present invention to provide a programmable communications apparatus, which is able to receive data from a plurality of data monitoring devices, which may be connected by

any wired or wireless means, and that each of said devices has an associated status condition, such that the programmable communications apparatus can transmit data from said devices on request or periodically to a fixed or mobile telephone or IP address to which the said apparatus is linked.

It is a further object of the present invention to provide a programmable communications apparatus, in which the said first alarm means may communicate directly with a central communications point in the network.

It is a further object of the present invention to provide a programmable communications apparatus, in which the said first alarm means may communicate directly with a web page and write information to that page or cause an E-mail to be sent to a specific address.

It is a further object of the present invention to provide a programmable communications apparatus, which comprises a second alarm means, which can be programmed to cause a message to be sent to the fixed or mobile number to which the said apparatus is linked in the case that the battery is low in power or in the case that the battery is removed or in the case that the communicator be switched off.

It is a further object of the present invention to provide a programmable communications apparatus, which comprises a second alarm means, which can be programmed to send a message periodically comprising any status message such as the current power status of the battery.

It is a further object of the present invention to provide a programmable communications apparatus, which comprises a battery charger adapter-pin such that the apparatus can make use of suitable battery chargers of other mobile phones.

It is a further object of the present invention to provide a programmable communications apparatus, which comprises the means to be interrogated remotely by another fixed or mobile telephone or network connected device, such that different codes are used to obtain different data from the said apparatus. In the context of remote health monitoring, by way of example, a doctor could send different codes from her mobile terminal and obtain different data on blood pressure and the heart rate of the person wearing the apparatus associated with a health monitoring system. The said apparatus may make use of physical monitoring means associated with said apparatus for providing information about the skin temperature and blood pressure and other characteristics of the human body.

It is a further object of the present invention to provide a programmable communications apparatus, which has application to smart clothes such that it provides a secondary communications means for emergency service personnel.

It is a further object of the present invention to provide a programmable communications apparatus, which is suitable for attachment to a life vest. A further object of this application includes a water-enabled communications apparatus, which may be used to communicate with a portable central communications unit.

It is a further object of the present invention to provide a programmable communications apparatus, which comprises a GPS signal processing circuit and the means to respond to an authenticated request to determine its own position and send data relating to its position to the linked fixed or mobile telephone or to a location determination centre or to a specified web page.

It is a further object of the present invention to provide a programmable communications apparatus, which may be securely attached to a device such as a bicycle, which may be used for communication and for determining the position of the bicycle.

It is a further object of the present invention to provide a programmable communications apparatus, which is suitable for young children such that it comprises an auto-answer facility to connect the caller immediately with an associated microphone and loudspeaker to avoid the need that the child must press a button to answer the call. This application also includes the feature, which returns the programmable communicator automatically to idle state as soon as the caller to the child terminates the call remotely. This avoids the need that the child must terminate the call. It also prevents the child from terminating the call by accident.

It is a further object of the present invention to provide a programmable communications apparatus, which can be used with mobile location based services such that it is possible for an authenticated person to access a web page, either on a hand-held terminal or fixed device, which shows the position of the programmable communications apparatus as an icon on a

map after its position has been determined by its own GPS signal processing circuitry or remotely by the network.

Other objects and advantages of this invention will become apparent from the description to follow when read in conjunction with the accompanying drawings.

BRIEF SUMMARY OF THE INVENTION

Certain of the foregoing and related objects are readily-attained according to the present invention by the provision of a novel portable programmable communicator, which serves to address the diverse communication requirements of children and elderly persons and for the purposes of remote data monitoring applications such as for monitoring the status of remote technical devices.

The programmable communicator preferably comprises a basic mobile telephone circuit having no keypad or display and a rechargeable battery and antenna and a basic two-way microphone device and remotely pre-programmable identity module linking it to a single mobile or fixed telephone. Where appropriate, in alternative embodiments, the programmable communicator comprises an alarm means to indicate certain conditions of the communicator such as the charge level of its battery or if the battery is removed. Similar alarm messages are generated according to the particular embodiment of the programmable communicator application which include the generation of messages when an associated wrist strap or attachment of the communicator in the case of a smart clothes application is undone or displaced

or when the communicator is switched on or off or when the communicator is set to monitor the status condition of an associated device and the status changes beyond a preset threshold level. The invention also includes the generation of periodic messages to indicate that the communicator is working and that any associated status condition thresholds remain unchanged. This last set of messages, which includes periodic reassurances messages includes the facility that the user may set the duration of the period according to the application.

The programmable communicator has direct and effective application to home networks for the purpose of transmitting information about the status condition of domestic appliances such as the pressure of water pipes and whether a door or window is opened or closed. The wireless programmable communicator can be attached to an associated monitoring device and programmed with the number of a mobile or fixed telephone to which it is to be linked or to an Internet web page which can be made accessible to authenticated users or to security monitoring personnel.

Other objects and features of the present invention will become apparent from the following detailed description considered in connection with the accompanying drawings, which disclose one embodiment of the invention. It is to be understood, however, that the drawings are designed for the purpose of illustration only and that the particular description of the portable hot link communicating apparatus is given by way of example only and does not limit the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates the schematic of the programmable communicator according to one embodiment of the invention.

FIG. 2 illustrates a schema showing the actions performed by the programmable communicator in response to an incoming call or message according to the present invention.

FIG. 3 illustrates a schema showing actions done by the programmable communicator and the outgoing calls

or messages, which are generated as a consequence of said actions.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now in detail to the drawings and in particular FIG.1 thereof, therein illustrated is a programmable communicating apparatus according to one embodiment of the present invention.

The following description makes reference to the detailed features as outlined in the objects of the invention.

In Figure 1 is shown a telephone circuit 10, which comprises an antenna 20 and a battery 30. To the telephone circuit, which may similarly comprise a communicating PDA device circuit, is shown an optional BlueTooth module 40 for communication with a nearby data communication or programming device having a similar BlueTooth radio module. The telephone circuit 10 has a ringing tone generator and an auto answer module 50 which may be used to cause the programmable communicator to generate one of a number of ringing tones or to auto answer upon receipt of an authenticated permitted caller.

For the purposes of programming the IP address or telephone number of the fixed or mobile telephone to which the communicator is linked is provided an SMS processing means 60. This communicates with an authentication means 90, which in turn is able to store numbers into a permitted callers list 110. For the purposes of security, a sound byte capture means and threshold detector means 100 is provided to

generate an alarm message or to send a sound byte to one of the numbers on the permitted callers list. Additional voice recognition software may be used to convert the sound byte into text and send this to the destination telephone number or IP address.

An SMS alarm generation means 70 is provided to work together with a battery charge monitor 35 and a sensor means 80 and an alarm message list 120 and a programmable interface means 140 to generate alarm messages in response to changes in status conditions. Said programmable interface means may be attached to all manner of sensor devices for the purpose of relaying data from external devices and sensors either automatically or in response to a request for information from a remote device.

The periodic status report means 130 may be programmed to provide data on the current status of the programmable communicator as well as data from one or more devices, which may be connected to the communicator via the BlueTooth module 40.

In the case that the programmable communicator is unable to make an immediate connection with the linked telephone or IP address, a reselection means 150 provides one or more connection numbers from the permitted callers list.

This device comprises a novel combination of existing technologies and features, which make possible the existence of a new and improved communicating apparatus to address the communication needs of children and elderly persons and for programmable data tags for monitoring the status of associated technical equipment.

The use of the programmable communicator involves two phases, a pre-programming phase and an active phase. In the pre-programming phase, the communicator is programmed with the number it can call which comprises a unique code. By way of example only, the invention is now described in the context of the GSM mobile telecommunications standard using the Short Message Service or SMS circuit-switched data call. The invention relates to all telephone standards including, and not limited to CDMA and US-TDMA, and is effectively used also in a packet switching mode such as the GSM GPRS packet switching mode. Furthermore the invention is suitably applicable to IP devices, which comprise IP addresses rather than telephone numbers.

According to the invention, it is wished to allow only authenticated callers to change the telephone number or IP address of a fixed or mobile telephone or network device to which the programmable communicator is to be linked. This may be done in GSM using an SMS message, which includes data as well as a unique code such as the unique code of the Subscriber Identity Module or SIM card, often referred to as the PUK code. The PUK code is a unique identifier, which is different for every SIM card. The choice of the PUK is made by way of example only and any similar unique coding may be used for the purpose of the invention

It is a straightforward procedure to communicate with the programmable communicator by SMS. The remote transmitting device includes the PUK code of the receiving programmable communicator in its SMS transmission as well as a telephone number to which the programmable communicator is to be linked.

The programmable communicator includes a processing means to determine that the PUK code is correct and the means to store the transmitted number. The PUK code may also be used to program the list of permitted callers. An SMS comprising the PUK code may contain a plurality of telephone numbers each of which designates a permitted caller's number. Only numbers, which are stored as designated permitted callers, will cause the programmable communicator to generate a ringing tone. Alternatively, the programmable communicator may include circuitry to terminate the calls of non-permitted callers automatically. In the same way that the telephone number of an incoming call can be shown on the screen of a mobile phone before the phone is

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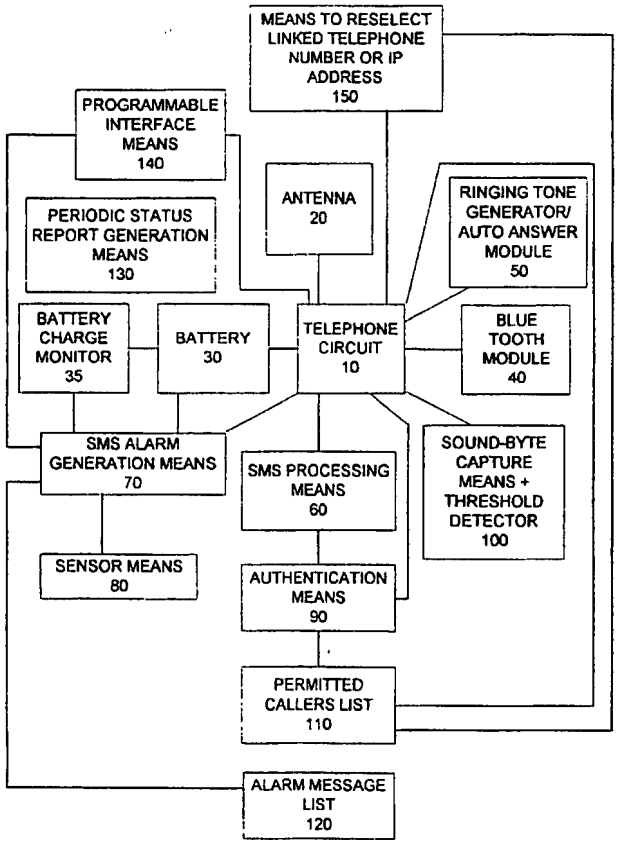

(57) Abstract: A system and method for a programmable communicator is described which can provide an improved child communication device, a telecommunications platform for a smart clothes application, as well as a programmable remote data communicator to report the status of a technical apparatus such as a vending machine. The programmable communicator can be programmed remotely by a mobile phone or any Personal Data Assistant (PDA) type device using any data transmission technology such as BlueTooth, Infra red light or any wireless radio communication either directly at close range, or via a mobile telecommunications network connection from a hand-held device or computer terminal connected to a data or IP transmission network such as the Internet.

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 276 729 A (OTAKE ET AL) 4 January 1994 (1994-01-04) abstract	1-4,14
Y	column 2, line 44 -column 4, line 9 column 6, line 14 - line 34	14,16
Y	column 8, line 52 -column 9, line 9 column 10, line 66 -column 13, line 16	14,65,66
A	column 16, line 23 - line 40 figures 1,3	36,37,62

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 742 666 A (ALPERT) 21 April 1998 (1998-04-21) abstract	14,16
A	column 3, line 6 - line 50 column 5, line 8 -column 6, line 5 column 6, line 59 -column 7, line 34 column 8, line 42 - line 54 column 13, line 51 -column 14, line 48 figures 1-3,8	18, 20-22, 24,25, 27,28, 30, 36-40, 42,49,57
Y	US 5 940 752 A (HENRICK) 17 August 1999 (1999-08-17) abstract	14,65,66
A	column 2, line 9 - line 31 column 3, line 47 -column 4, line 34 column 5, line 25 -column 6, line 14 figures 1,2,5	1,3,64
X	US 5 802 460 A (PARVULESCU ET AL) 1 September 1998 (1998-09-01) abstract	1-3,14, 33
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